UNITED STATES PATENT AND TRADEMARK OFFICE

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10/645,987	08/22/2003	Tirthankar Lahiri	OI7030762001	8636

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EXAMINER
ELMORE, REBA I

ART UNIT	PAPER NUMBER
2189	

DATE MAILED: 11/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 August 2003</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-31</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) <u>1-31</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>22 August 2003</u> is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1-31 are presented for examination.

DRAWINGS

2.   The drawings are objected to because labels or legends need to be used to identify the

boxes shown in the figures (MPEP 608.02(o)).

3.   Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to

the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the

drawings for consistency. Additional replacement sheets may be necessary to show the

renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

SPECIFICATION

4.   The disclosure is objected to because of the following informalities:

acronyms must be defined at their first usage in the specification –

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'disk IOs" on page 1, line 5;

Fig. 1J needs to be identified as a new paragraph instead of an extension of the description given for figures 1C-1I. Appropriate correction is required.

5. The abstract of the disclosure is objected to because the first sentence is not considered proper content for the abstract. The following is suggested as a replacement for the current abstract:

'An electronic and computerized system coalesces write input/output operations (IOs) using a buffer cache which stores data waiting to be written back to a disk of the electronic and computerized system. Dirty data blocks with consecutive data block addresses in the buffer cache are coalesced and written to the disk together. The disk head movements performing the write IOs are significantly reduced, thereby allowing the electronic and computerized system to maintain a high IO throughput and high peak performance with few disks.'

Correction is required. See MPEP § 608.01(b).

6. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

CLAIM OBJECTIONS

7. Claim 3 is objected to as having a spelling or typographical error. Claim 3, line 3, 'identified firs' needs to be –identified first--.

35 USC § 101

8. 35 USC § 101 reads as follows:

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> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9.   Claim 31 is rejected under 35 USC § 101 because the claimed invention is directed to non-statutory subject matter. This interpretation is based on the following reasoning:

Claim 31 is not limited to tangible embodiments. In view of the Applicant's disclosure, specification page 15, paragraph 0045, the medium is not limited to tangible embodiments, instead being defined as including both tangible embodiments (e.g., ROM 409, CD ROM, magnetic tape, magnetic discs, main memory) and intangible embodiments (e.g., transmission medium). As such, the claim is not limited to statutory subject matter and is therefore non-statutory.

10.   Additionally, the language of claim 31 raises a question of including inoperative claim limitations. Claim 31 is rejected under 35 USC § 101 because the disclosed invention is inoperative and therefore lacks utility.

Claim 31 states using 'computer usable medium' which the specification, page 15, paragraph 0045, defines as being 'transmission media'. A computer usable medium such as that claimed, must have the capability of storing data for execution by a computer or processing system. Transmission media cannot be used to store the executable code for use in the system. Coaxial cable, copper wire, fiber optics, carrier waves and electromagnetic waves provide connectivity within the system but it is a misuse of the terminology in the memory art to imply these elements also 'store' data without further teaching how to make and use these elements in such a way.

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35 USC § 102

11.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
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> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

12.   Claims 1-7, 12-13, 15, 19, 21-24, 28-29 and 31 are rejected under 35 U.S.C. 102(e) as

being anticipated by McKinney et al.

13.   Herbst teaches the invention (claim 1) as claimed including a method for reducing

input/output operations (IOs) by coalescing writes in a computer system, the computer system

comprising:

identifying, in a first storage location, a first data block ready to be written into a second

storage location, the first data block having a first data block address as a first data block stored

in the write cache (e.g., see col. 2, lines 25-40);

identifying, in the first storage location, additional data blocks to be written into the

second storage location as identifying disc contiguous data block (e.g., see col. 2, lines 25-40);

writing the identified first and additional data blocks to the second storage location with a

single write IO (e.g., see col. 2, lines 25-40); and,

wherein the first data block and the additional data blocks form a set of data blocks with

consecutive data block addresses to be stored in the second storage location, the consecutive data

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block addresses having a range that contains the first data block address with the consecutive

data block addresses being a disc system (e.g., see col. 2, lines 25-40).

As to claim 2, Herbst teaches tracking a total number of the identified first and additional

data blocks as managing write operations (e.g., see col. 2, lines 4-49).

As to claim 3, Herbst teaches setting a predetermined upper limit for the total number of

the identified first and additional data blocks, wherein if the predetermined upper limit is met by

the total number of the identified first and additional data blocks, the method stops identifying

additional data blocks and immediately writes the identified first and additional data blocks to

the second storage location as the computer system using a write cache memory which has a

finite number of locations for temporary storage. Once the cache is filled, data must be written

back to the disc. This feature is an inherent capability of a cache memory.

As to claim 4, Herbst teaches copying each of the identified first and additional data

blocks to a temporary storage location, wherein writing the identified first and additional data

blocks to the second storage location is accomplished by writing copies of the identified first and

additional data blocks in the temporary storage location to the second storage location as using a

write cache (e.g., see col. 5, line 57 to col. 6, line 11).

As to claim 5, Herbst teaches marking the identified first and additional data blocks in the

first storage location not dirty each time after an identified data block is copied to the temporary

storage location as doing a read back of the data element which would eliminate the dirty status

of the block (e.g., see col. 5, lines 21-37).

As to claim 6, Herbst teaches the temporary storage location is a temporary buffer cache

(e.g., see col. 5, line 57 to col. 6, line 11).

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As to claim 7, Herbst teaches sequentially searching the first storage location to identify next data blocks with higher or lower data block addresses consecutive to the first data block address as determining whether or not there is uncommitted data waiting to be written to the disc (e.g., see col. 6, line 56 to col. 7, line 17);

determining whether an identified next data block·is dirty with the determination as to whether there is uncommitted data waiting to be written to the disc (e.g., see col. 6, line 56 to col. 7, line 17); and,

wherein if the identified next data block is not dirty, the method stops sequentially searching for new data blocks with data block addresses at a same data block address side to the data block addresses of the identified next data block (e.g., see col. 6, line 56 to col. 7, line 17).

As to claim 12, Herbst teaches the first storage location is a buffer cache (e.g., see col. 5, line 57 to col. 6, line 11).

As to claim 13, Herbst teaches the second storage location is a disk (e.g., see col. 5, line 57 to col. 6, line 11).

As to claim 15, Herbst teaches copying the first and additional data blocks to form a copy of the first and additional data blocks and allowing other entities in the computer system to access the copy of the first and additional data blocks during the act of writing the first and additional data blocks (e.g., see col. 7, line 45 to col. 8, line 6).

As to claim 19, Herbst teaches the first storage location is a buffer cache, wherein the entire buffer cache is search (e.g., see col. 5, line 57 to col. 6, line 11).

14.   Herbst teaches the invention (claim 21) as claimed including a computer system comprising:

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a first storage means for storing data in a first plurality of data blocks with the first data block having a first data block address as a first data block stored in the write cache (e.g., see col. 2, lines 25-40);

a second storage means for storing data in a second plurality of data blocks as a disc (e.g., see col. 5, lines 21-37);

means for identifying, in the first storage means, a first data block and additional data blocks to be written into the second storage means, the first data block having a first data block address as determining whether the write cache has uncommitted data (e.g., see col. 6, line 56 to col. 7, line 32);

means for writing the identified first and additional data blocks to the second storage means with a single write IO (e.g., see col. 2, lines 25-40); and,

wherein the first data block and the additional data blocks form a set of data blocks with consecutive data block addresses to be stored in the second storage means, the consecutive data block addresses having a range that contains the first data block address with the consecutive data block addresses being a disc system (e.g., see col. 2, lines 25-40).

As to claim 22, Herbst teaches a means for tracking a total number of identified first and additional data blocks, means for setting a predetermined upper limit of the total number of identified first and additional data blocks, wherein if the predetermined upper limit is met by the total number of the tracking means, the computer system stops identifying additional data blocks and immediately writes the identified first and additional data blocks to the second storage means as the computer system using a write cache memory which has a finite number of locations for

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temporary storage. Once the cache is filled, data must be written back to the disc. This feature is an inherent capability of a cache memory.

As to claim 23, Herbst teaches a temporary storage means for temporarily storage data in a third plurality of data blocks as the write cache which has a plurality of temporary storage for data block , means for copying each of the identified first and additional data blocks to a temporary storage means, means for marking the identified first and additional data blocks in the first storage means not dirty each time after an identified data block is copied to the temporary storage means, wherein writing the identified first and additional data blocks to the second storage means is accomplished by writing copies of the identified first and additional data blocks in the temporary storage location to the second storage location as using a write cache (e.g., see col. 5, line 57 to col. 6, line 11).

As to claim 24, Herbst teaches the temporary storage means is a temporary buffer cache (e.g., see col. 5, line 57 to col. 6, line 11).

As to claim 28, Herbst teaches the first storage means is a buffer cache(e.g., see col. 5, line 57 to col. 6, line 11).

As to claim 29, Herbst teaches the second storage means is a disk (e.g., see col. 5, lines 6-37).

15.   Herbst teaches the invention (claim 31) as claimed including a computer program product comprising a computer usable medium having executable code to execute a process for reducing IOs by coalescing writes in a computer system, the process comprising:

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identifying, in a first storage location, a first data block ready to be written into a second storage location, the first data block having a first data block address as a first data block stored in the write cache (e.g., see col. 2, lines 25-40);

identifying, in the first storage location, additional data blocks to be written into the second storage location as identifying disc contiguous data blocks (e.g., see col. 2, lines 25-40);

writing the identified first and additional data blocks to the second storage location with a single write IO (e.g., see col. 2, lines 25-40); and,

wherein the first data block and the additional data blocks form a set of data blocks with consecutive data block addresses to be stored in the second storage location, the consecutive data block addresses having a range that contains the first data block address with the consecutive data block addresses being a disc system (e.g., see col. 2, lines 25-40).

35 USC § 103

16.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17.   Claims 8-11, 14, 16-18, 20, 25-27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al.

18.   Herbst teaches the limitations of the independent claims and intervening claims as given above.

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19.   As to claims 8-11, 16-17, and 25-27, Herbst does not specifically teaches sequentially searching the first storage location is conducted alternatively at the lower and higher data block address sides to the first data block address, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to search for both lower addresses and upper addresses consecutive to the temporarily stored block addresses and official notice is taken thereof.

20.   As to claims 14, 18 and 30, Herbst does not specifically teach the computer system is a database system, however, a database system is merely the organization of the stored data. The present invention has not been claimed giving the organization of the data specific importance. It would have been obvious to one of ordinary skill in the memory art at the time the invention was made to establish the stored data in a database system format and official notice is taken thereof.

21.   As to claim 20, Herbst does not specifically teach searching the entire cache buffer using a hashing operation,, however, the Applicant's specification does not teach or show how the searching is performed using hashing. This limitation appears to be a nominal recitation directed toward the typical hashing used for performing address searching. It would have been obvious to one of ordinary skill in the memory art at the time the invention was made to utilize a hashing algorithm to search the entire write cache and official notice is taken thereof.

CONCLUSION

22.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reba I. Elmore, whose telephone number is (571) 272-4192. The examiner can normally be reached on M-TH from 7:30am to 6:00pm, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the art unit supervisor

for AU 2187, Donald Sparks, can be reached for general questions concerning this application at

(571) 272-4201. Additionally, the official fax phone number for the art unit is (703) 746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the Tech Center central telephone number is (571) 272-2100.

Reba I. Elmore
Primary Patent Examiner
Art Unit 2187

November 27, 2005

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